

We claim:

1. A nerve regeneration device comprising a polyhydroxyalkanoate polymer in the form of a porous conduit.
2. The device of claim 1 wherein the polymer comprises 4-hydroxybutyrate.
3. The device of claim 2 wherein the polymer is poly-4-hydroxybutyrate.
4. The device of claim 1 wherein the pores of the conduit are greater than 5 $\mu$ m in diameter.
5. The device of claim 1 wherein the pores of the conduit are less than 500  $\mu$ m in diameter.
6. The device of claim 1 wherein the conduit comprises a material selected from the group consisting of nerve cells, growth factors, and drugs.
7. A method for preparing a nerve regeneration device comprising a polyhydroxyalkanoate polymer in the form of a porous conduit wherein the device is prepared by thermally induced phase separation of the polymer in a solvent in combination with salt particles, removing the polymer solvent, and removing the salt particles.
8. The method of claim 7 comprising leaching with an alcohol followed by leaching with water or a solution comprising a surfactant.
9. The method of claim 7 for preparing the device of claim 1 wherein the device is prepared by a combination of thermally induced phase separation and poragen leaching.
10. The method of claim 8 wherein the surfactant is a polysorbate
11. A method of nerve repair or regeneration comprising providing a nerve regeneration device comprising a

polyhydroxyalkanoate polymer in the form of a wrapped porous conduit.

12. The method of claim 11 comprising inserting severed nerve ends into the conduit or wrapping the nerve ends with the polymer and sealing it into a conduit.

13. The method of claim 12 wherein the device is sealed by application of heat.

14. The method of claim 11 providing an axonal regeneration rate of at least 0.8 mm per day across a 10 mm sciatic nerve gap in an animal or human.